FreeSpace® E4 Series II Business Music System

OWNER'S GUIDE

BOSE®

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1.1 The Bose® FreeSpace® E4 Series II business music system

The Bose FreeSpace E4 Series II system is an integrated four-channel digital signal processor and 400-watt power amplifier for 70/100V business music applications.

The E4 system has a total of four source inputs, including two Line In, one Mic/Line and one Mic/Page/Line, to provide the inputs needed for most business music installations. The system also has a direct input which can override the sources playing on all four output channels.

The E4 system has four amplifier output channels which can be configured for different zones. A Music on Hold output is also provided for simple integration into a phone system.

In a single chassis, it provides all of the processing and control features required for one-to-four zone business music applications. These features include:

- **Auto Volume:** When used with the optional FreeSpace system Auto Volume Sense Mic, E4 system electronics dynamically control the program level in each zone so your customers can always hear it, regardless of the background noise.
- **Scheduling:** Allows you to program the E4 system electronics for automated on/off control, source changes, and volume changes according to time of day or day of week.
- **Multi-Zone Paging:** Allows you to initiate a page from a single keypad to one or more of the zones being powered by the same E4 system.
- **Opti-voice® Paging:** Provides a smooth transition between music and page signals.
- **Opti-source® Input Leveling:** Monitors the input level of up to four sources and continually makes adjustments to maintain a consistent volume level between different sources.
- **Dynamic Equalization:** Maintains tonal balance at all listening levels.
- **Room Equalization:** Provides easy adjustment of tonal balance in each zone.
- **Signal Routing:** Meets the demands of most four-zone systems, allowing for an input source to be routed to any of the four amplifier outputs.
- **Serial Data Interface:** RS-232 serial port for easy interfacing to your PC
- **Remote On/Off Input:** Accepts a remote STANDBY switch

The integrated 400-watt power amplifier features a patented power-sharing technology which dynamically allocates power to each output.

For example, if you have a two-zone system that requires 5 watts in Zone 1 and 395 watts in Zone 2, the FreeSpace E4 system electronics distributes the power based on those needs.

The E4 also includes an easy-to-replace memory module, which holds the system configuration settings and design file uploaded by the FreeSpace *Installer*™ software (see page 14).

1.2 E4 system accessories

Optional Bose accessories for the E4 system are available.

- **FreeSpace E4 System User Interface Kit (U.S.) (PC029856)**
  A wall-mountable keypad that fits into a standard U.S. single-gang junction box. It provides buttons for volume up/down control, 1-3 source selection, and mute.
- **FreeSpace E4 System User Interface Kit (Euro) (PC029857)**
  A wall-mountable keypad that fits into a standard Euro single-gang junction box. It provides buttons for volume up/down control, 1-3 source selection, and mute.
- **FreeSpace® E4 System Auto Volume Interface Kit (U.S.) (PC030101)**
  A wall-mountable keypad that fits into a standard U.S. single-gang junction box. It provides buttons for volume up/down control, 1-3 source selection, and Auto Volume on/off.
- **FreeSpace E4 System Auto Volume Interface Kit (Euro) (PC030102)**
  A wall-mountable keypad that fits into a standard Euro single-gang junction box. It provides buttons for volume up/down control, 1-3 source selection, and Auto Volume on/off.
- **FreeSpace E4 System Auto Volume Mic Kit (U.S.) (PC029859)**
  One sensing microphone that can be mounted as is or in a standard U.S. single-gang junction box.
- **FreeSpace E4 System Auto Volume Mic Kit (Euro) (PC029860)**
  One sensing microphone that can be mounted as is or in a standard Euro single-gang junction box.
- **FreeSpace E4 System Accessory Kit (U.S.) (PC030105)**
  Supplemental rear panel mating connectors and non-skid feet.
- **FreeSpace E4 System Rack Mount Kit (PC029858)**
  One pair of rack ears.
- **FreeSpace E4 System Page Interface Kit (U.S.) (PC030103)**
  A wall-mountable keypad that fits into a standard U.S. single-gang junction box. It provides buttons for 1-4 page zone selection, all page zones selection and initiate page.
- **FreeSpace E4 System Page Interface Kit (Euro) (PC030104)**
  A wall-mountable keypad that fits into a standard Euro single-gang junction box. It provides buttons for 1-4 page zone selection, all page zones selection and initiate page.

1.3 FreeSpace *Installer*™ software

Bose® FreeSpace *Installer* software is included with every E4 system. The *Installer* software allows you to configure hardware devices such as the E4 system. The *Installer* software is designed for use on a PC that is connected to the E4 system through a serial data interface.

The *Installer* software requires a computer system with the following minimum requirements:

- 400 MHz Pentium®-based PC
- 256 MB of RAM
- 50 MB of available hard-drive space
- RS-232 serial port
- 800 x 600 display
- 4x CD-ROM drive
- Microsoft Windows® 98, Windows® 98SE, Windows® NT, Windows® 2000, Windows® XP

2.1 Introduction

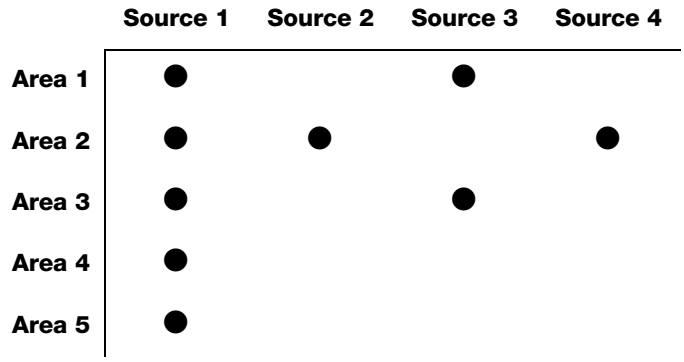
This section describes the basic steps for designing an E4 system and includes an example. It is assumed that a complete loudspeaker design and layout has already been created.

2.2 Basic design steps

There are five basic steps in designing an E4 system.

2.2.1 Step 1 – Determine source routing

Decide which sources will be played in each area. Create a "source map" such as the following one that shows which sources will be played in each major area of the facility.



2.2.2 Step 2 – Determine Auto Volume requirements

Identify which areas will use Auto Volume. Each Auto Volume zone must use one Auto Volume user interface and one Bose® sensing microphone to control the volume. A 70/100V volume control cannot be used.

When using Auto Volume, remember that you will be adjusting the volume of an overall area. Imagine that you have a dining area and a bar adjacent to one another. If the sensing microphone is placed above the bar, the music may become too loud in the dining area. Likewise, if you place the sensing microphone above the dining area, the music may never be heard in the bar.

Guidelines for establishing Auto Volume zones

Speaker height is...	Background noise is uniform	Background noise is non-uniform
>25 ft (7.6 m)	Not recommended	
12-25 ft (3.7-7.6 m)	One Auto Volume zone for every 3600 ft^2 (324 m^2)	One Auto Volume zone for every 1800 ft^2 (162 m^2)
<12 ft (3.7 m)	One Auto Volume zone for every 1800 ft^2 (162 m^2)	One Auto Volume zone for every 900 ft^2 (81 m^2)

Speaker mounting height and the overall quality of the background noise is used to determine the Auto Volume zoning requirements. Uniform background noise is found in an area where no part of the area is louder or quieter than any other. A room with non-uniform background noise would seem louder in some areas (people talking, machinery running, etc.) and quieter in others.

Mounting guidelines for sensing microphones

- The sensing microphone must be mounted at the same height as the loudspeakers or higher. A sensing microphone must never be mounted lower than the speaker height.
- In all cases, there must be 6 ft (1.8 m), minimum, between the loudspeaker and the sensing microphone. This is so that the microphone does not receive signals only from a loudspeaker.
- There must be 35 ft (10.7 m), minimum, between the sensing microphones of two adjacent Auto Volume zones.
- Avoid placing the microphone near unique noise sources like HVAC equipment, dishwashers, motors, etc.

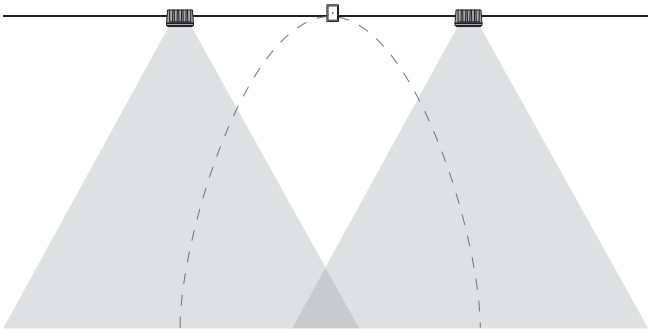
Separating the microphones as much as possible for two zones is the best practice. Consider the previous example of the dining area and a bar adjacent to one another. If each of these areas uses Auto Volume, it is possible to create a situation in the dining area where the music is too loud simply because the microphone

2.0 Designing with the E4 System

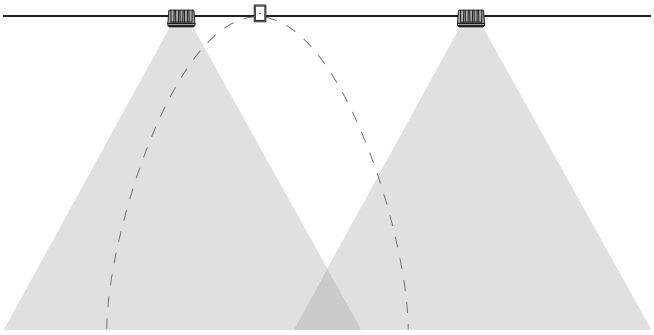
The following are examples of correct and incorrect sensing microphone placements:

Ceiling Flush

Correct placement

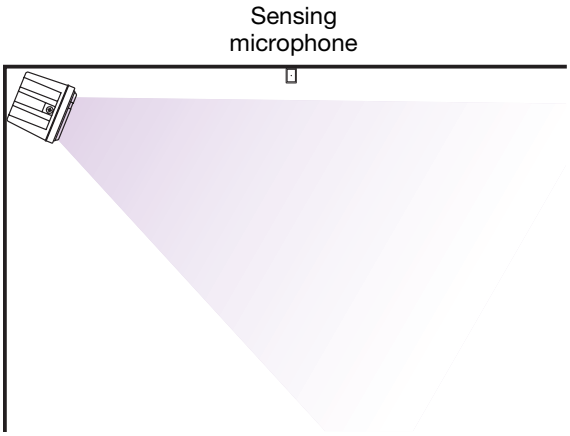


Incorrect placement

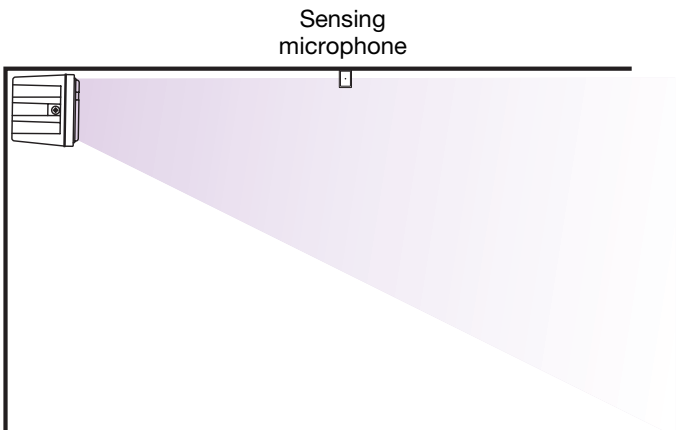


Wall Surface

Correct placement



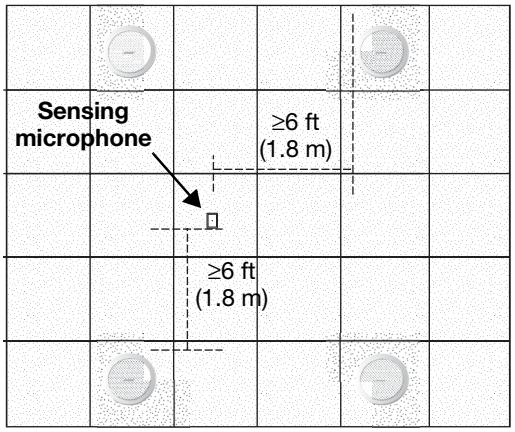
Incorrect placement



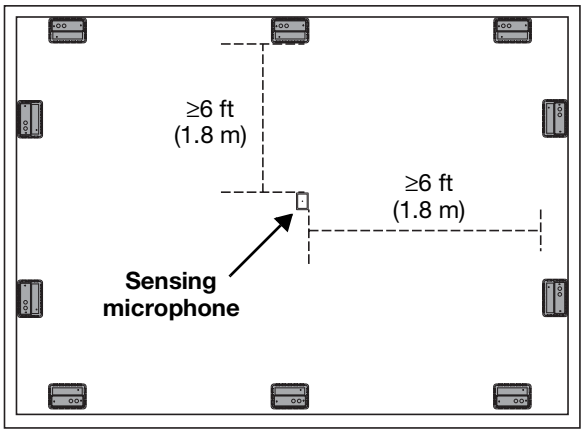
Installer's Note: *In applications where ceiling height is less than 12 feet (3.6 m), the microphone should be wall mounted.*

When mounting sensing microphones, always maintain a distance of 6 feet (1.8 m) minimum between the microphone and the speaker.

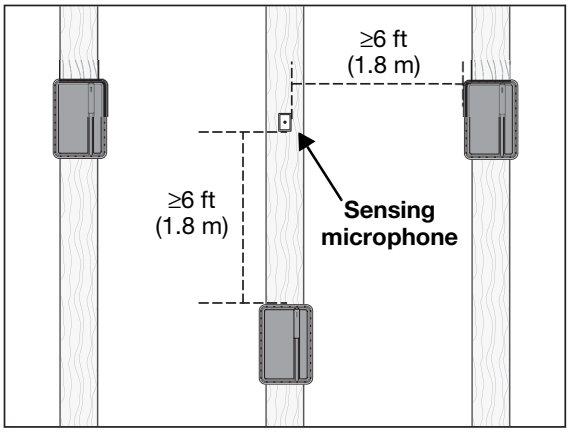
Ceiling Flush



Wall Surface



Ceiling Surface



2.2.3 Step 3 – Determine volume control requirements

Decide which areas will have volume controls. Create a control map, such as the following, showing the types of controls that will be used, and the areas in which they will be installed.

	Auto Volume Interface 1	Auto Volume Interface 2	70/100V Volume Control 1	70/100V Volume Control 2
Area 1	●			
Area 2				●
Area 3		●		
Area 4			●	
Area 5			●	

Standard and Auto Volume interfaces are available for use with the E4 hardware. Each offers control over source selection and volume. The Standard interface contains a Mute button, and the Auto Volume interface contains an Auto Volume on/off button. If you have identified an area that uses Auto Volume, you must use an Auto Volume interface to control this zone.

It is also possible to use 70/100V volume controls between the amplifier output and the speaker. If you plan to use 70/100V controls, be aware that they cannot be used in zones where either Auto Volume or Dynamic EQ is used. Auto Volume and Dynamic EQ monitor the amplifier output and make adjustments accordingly. Using a 70/100V volume control would cause these functions to operate improperly.

When determining the placement or physical location of the controls, first think about how the control is used. If the control is very rarely used or it requires a secure location, it should be placed with the equipment. If the control is for an area that requires frequent adjustments, then it is best to place the control in the area being controlled.

2.2.4 Step 4 – Determine the speaker requirements

Determine the speaker coverage required for the design. Consider the following points as you do this:

- Each Auto Volume function requires a separate zone. Each Auto Volume zone requires the dedicated use of one E4 output channel.
- Each type of actively equalized speaker requires the dedicated use of one E4 output channel. If you are designing a system that uses actively equalized speakers, such as the 102®F speaker, Model 32, Model 32SE, or Model 8, you must dedicate one E4 output channel for each speaker type.

Create a speaker map, such as the following, and match the speaker models to areas (Speaker Qty x Tap = Zone Power required):

	Model 32SE	FreeSpace 3-I	Speaker Qty	Tap	Area Power
Area 1		●	2	50	100
Area 2	●		5	8	40
Area 3		●	1	50	50
Area 4	●		3	4	12
Area 5	●		6	8	48

2.2.5 Step 5 – Determine the E4 requirements

Once you have identified the areas that use Auto Volume and unique loudspeakers, you can combine different areas based on the types of sources and controls they are using.

Now we can take a look at how the maps we created can help us determine the quantity of E4s we will need.

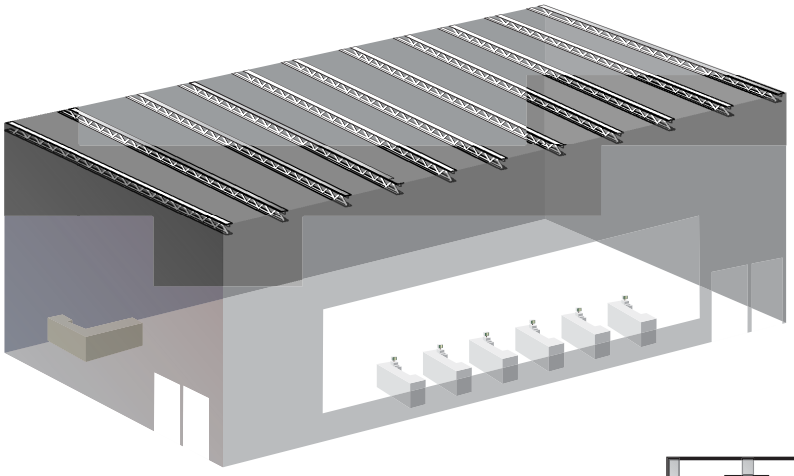
	Sources				Controls				Loudspeakers			
	1	2	3	4	AV1	AV2	VC1	VC2	M32SE	FS3	Total W	E4 Ch.
Area 1	●		●		●					●	100	1
Area 2	●	●		●				●	●		40	2
Area 3	●		●			●				●	50	3
Area 4	●						●		●		12	4
Area 5	●						●		●		48	4

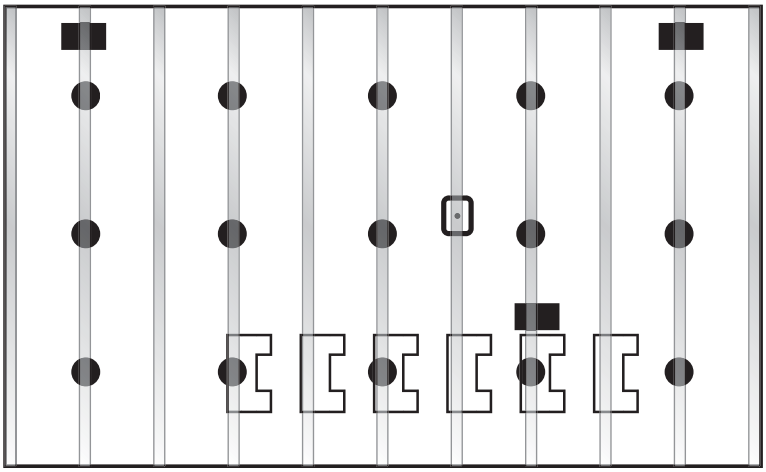
Total System Power = 250W

By combining the maps you can easily combine sources, speaker types, and control types. The information placed in this table suggests that Area 1 and Area 3 need to be grouped separately because they are Auto Volume zones requiring separate E4 system outputs. Area 2 uses one standard volume control requiring one E4 output channel. Areas 4 and 5 share a common volume control and can be combined on a third E4 output channel. Since only four outputs are required and the total combined power requirement is less than 400W, only one E4 unit would be needed for this system.

2.3 Auto Volume layout examples

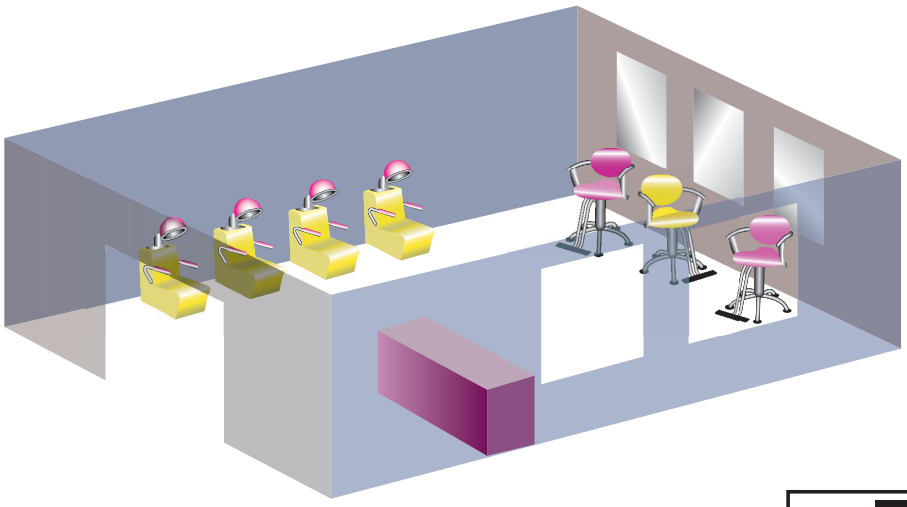
Large, open retail space with single music source





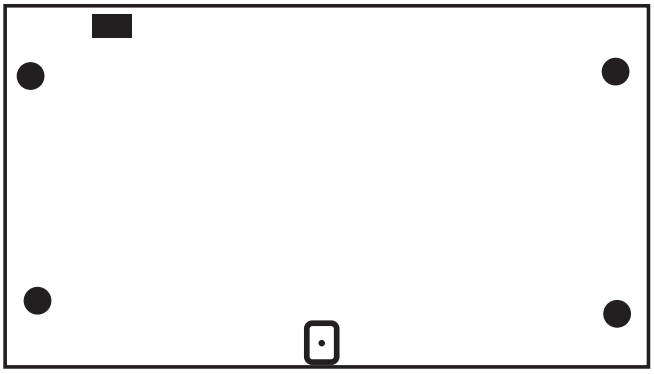
- FreeSpace® Acoustimass module
- Model 16 (pendant mounted)
- Sensing microphone

Hair salon (Small space with specific noise)

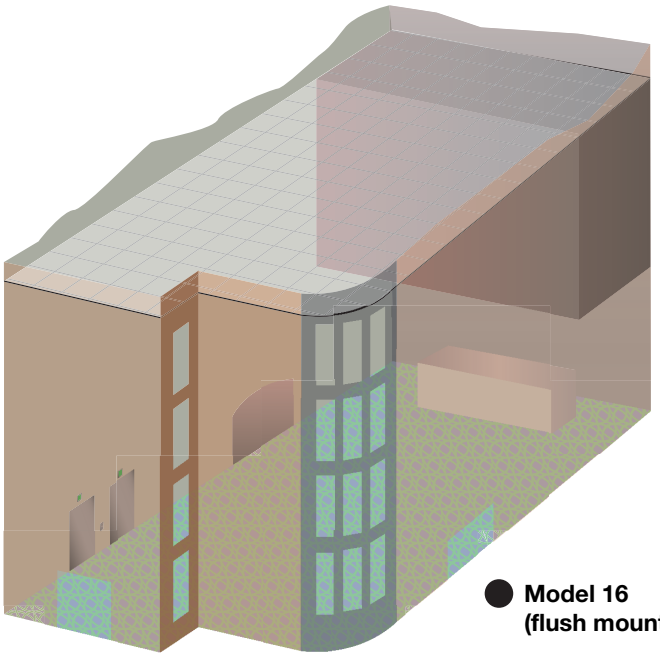


FreeSpace® 3 system

Sensing microphone

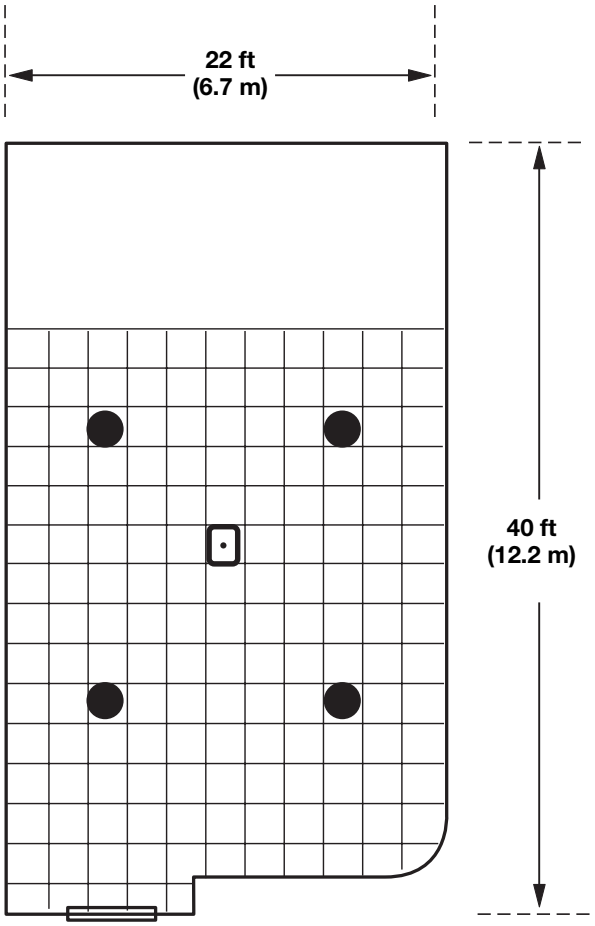


Hotel lobby



Model 16
(flush mounted)

Sensing microphone



Bose® Product Sales Conditions

Limited Warranty Policy
and
Conditions of Sale

Bose Corporation
The Mountain
Framingham, MA 01701

What is covered:

All parts defective in material and workmanship. This limited warranty for the Bose Freespace® E4 system ("system") covers the functionality of the system for its normal, intended use as specified in the Owner's Guide and does not cover a malfunction that has resulted from improper or unreasonable use or maintenance, accident, excess moisture, improper packing, lightning, power surges, or unauthorized tampering, alteration or modification while not under the control of Bose. Bose systems are not designed to be used in every environment, so please review your Owner's Guide.

WHERE PERMITTED, THE PROVISIONS OF THIS LIMITED WARRANTY ARE IN LIEU OF ANY OTHER WRITTEN WARRANTY, WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

For how long:

In countries where the duration of the warranty is not determined by statute, the Bose Limited Warranty lasts five years from the purchase date. For countries where minimum warranty terms are determined by statute, the warranty term is the longer of the statutory period or the term listed above.

What we will do:

We will repair or replace any defective parts within a reasonable period of time and free of charge.

How you can obtain warranty service:

1. You can ship the system to either a Bose Service Agency or to Bose directly with a proof of purchase from an authorized dealer.

   Please:

   A. Properly and carefully pack the product for shipping. If you need a carton for shipping, contact Bose for a new carton.

   B. Label and ship the product to the appropriate Bose location.

   C. Please contact Bose to get a return reference number. Place this number prominently on the outside of the carton.

2. You can return the system with proof of purchase from an authorized dealer to a Bose Service Agency or directly to Bose. Proof of purchase is not required where it is excluded by statute.

Other Rights:

EXCLUSIVE REMEDY:

THIS LIMITED WARRANTY IS FULLY TRANSFERABLE PROVIDED THAT THE CURRENT OWNER FURNISHES THE ORIGINAL PROOF OF PURCHASE FROM AN AUTHORIZED BOSE DEALER. THE MAXIMUM LIABILITY OF BOSE SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID BY YOU FOR THE PRODUCT. IN NO EVENT SHALL BOSE BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES. SOME PLACES DO NOT ALLOW LIMITATIONS ON THE EXCLUSION OR LIMITATION OF RELIEF, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES OF THE LIMITATION OF LIABILITY TO SPECIFIED AMOUNTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

OTHER CONDITIONS:

FOR YOUR BENEFIT, WE RECOMMEND THAT YOU RECORD YOUR SERIAL NUMBERS(S), FOUND ON THE PRODUCT(S), AND OTHER PURCHASE INFORMATION, AND KEEP IT WITH YOUR PERSONAL RECORDS ALONG WITH PROOF OF PURCHASE. IF NECESSARY, THIS INFORMATION WILL ALLOW US TO BETTER SERVE YOUR NEEDS.

THIS LIMITED WARRANTY GIVES YOU SPECIFIC RIGHTS SUBJECT TO SPECIFIED CONDITIONS. YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH APPLY TO THE PRODUCT YOU HAVE ACQUIRED. THESE LEGAL RIGHTS VARY FROM STATE TO STATE OR COUNTRY TO COUNTRY. SOME PLACES DO NOT ALLOW THE EXCLUSION, RESTRICTION OR MODIFICATION OF CERTAIN IMPLIED RIGHTS OR THEIR EFFECT. IN THOSE SITUATIONS THIS LIMITED WARRANTY WILL ONLY APPLY TO THE EXTENT THAT THE APPLICABLE LAW ALLOWS. OTHER LAWS PROVIDE YOU WITH A STATUTORY CLAIM AGAINST THE SELLER.

The laws of your state or country may provide you with legal claims against the seller or manufacturer of this product. The Limited Warranty does not affect those rights.

Remedies:

The provisions of this limited warranty are in lieu of any other warranties or conditions, except those provided by law. This Limited Warranty does not affect any legal rights provided to you by law and does not preclude any legal remedy you may have under the law.

This Limited Warranty is fully transferable provided that the current owner furnishes the original proof of purchase from an authorized Bose dealer.

This Limited Warranty is void if the label bearing the serial number has been removed or defaced.

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